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Chapter 16

DECEPTION AND FRAUD IN THE PUBLICATION OF SCIENTIFIC RESEARCH: ARE THERE SOLUTIONS?

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ABSTRACT

A number of events in the U.S. and abroad have refocused the scientific community on historical issues of whether, and how, integrity of our technical literature can be assured. Solutions to this problem are neither simple nor certain. Professional societies have addressed scientific misconduct, and effective responses by the research community will require cooperation of scientific publications. While the incidence of scientific fraud is difficult to estimate with precision and certainly varies with discipline, identified and publicized recent cases beg attention from editorial boards. Several egregious cases are described. The peer review system serves the function of examination and critique by scientists in relevant disciplines to assess submitted papers prior to publication. There is even a developing literature and several specific journals dedicated to the subject of fraud, professional integrity and ways to monitor or correct existing conditions. Underlying the field of professional and scientific publication is a fundamental assumption that data are real and that research actually occurred. Typically, the process is "blind" in both directions, although some journals permit "author-directed" reviews. A reviewer's responsibilities include ensuring that text properly reflects data, that tables and figures are necessary/appropriate, and that conclusions fairly and reasonably reflect results and the body of information. Thus, existing peer review systems probably cannot detect anything but the most obvious fraud. In addition to imposing or perpetuating stringent review protocols, journals also can amend author guidelines to speak explicitly about publishing requirements. Cases of properly documented fraud warrant immediate public announcement, followed by official withdrawal or retraction. Reflection on these issues led editors of one journal to institute changes in editorial policies and develop a code of ethics for authors, reviewers, and editors. Prevention of dishonest research is already difficult, and we should ensure that this remains the case. Editors should formally commit reviewers/authors to ethical conduct in technical publications prior to publication and review.

Keywords: Fraud, scientific research, peer review

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1. INTRODUCTION

To quote Sir Winston Churchill: "Truth is incontrovertible. Malice may attack it and ignorance may deride it, but, in the end, there it is." Mark Twain looked at this question from the darker side and concluded: "One of the most striking differences between a cat and a lie is that a cat has only nine lives." With the huge stakes that ride on technical, medical or engineering decisions every day, it seems quite obvious that veracity in the scientific literature (… our literature) is essential. However, multiple events over the last several years in Norway, South Korea and elsewhere have refocused the scientific community on the unpleasant issue of whether, and by what means, we can ensure the continued integrity of our technical literature. Many scientific journals have set aside significant time and effort to address this thorny problem, and have struggled to find practical and effective solutions that may be suitable to their respective disciplines.

2. DISCUSSION

Potential scientific misconduct and fraud can come in many colors, and may include fabrication/falsification of data (aka "fudging", "culling", "massaging"), plagiarism, nondisclosure, violation of standards for human or animal research, and "ghostwriting" or "gift authorship." These events in principle should be clearly and quickly distinguished from honest error or scientific sloppiness, though in practice that distinction may be very difficult to accomplish.

In a recent Norwegian case which received international attention (Pincock 2006; Sudbo et al. 2005), regarding a publication in the prestigious medical journal The Lancet, the primary author confessed to the complete fabrication of all data in a clinical study investigating the influence of nonsteroidal anti-inflammatory drugs on oral cancer incidence. Even more highly publicized was the recent case of W.S. Hwang, who reported the laboratory cloning of human embryos in a mainstay of the scientific publishing world, the journal Science (Hwang et al. 2004; Hwang et al. 2005). These events involved several separate articles, each of which had many co-authors, ranging from 13 in the Sudbo et al. paper to more than 20 in one of the Hwang reports. A related but distinct part of the problem was identified by Schulz (2008), who discussed the case of a researcher from India who reportedly published 70 papers in 25 journals in three years. Evidently, the tactic was to "flood journals with manuscript submissions in the hopes of wearing down editors".

Whether an instance of scientific fraud is conducted for financial gain or for professional advancement, reports of such academic dishonesty are by no means novel, nor are they limited to any particular field of research. Medicine, physics, chemistry, physiology, anthropology, psychology and other disciplines all can claim a share of the bad news. Not surprisingly, the subject even has prompted at least a scholarly book or two (e.g., Lock et al. 2001; Judson 2004), a few in the popular literature also (e.g., Park 2001; Rivlin, 2004), an ongoing electronic bibliography (Pearson, 2005),and some official interest in government circles as well (Office of Research Integrity, 2000).

Prominent historical examples of scientific fraud, going back to Piltdown Man in the early-1900s (anthropology), also include the Schon case at Bell Labs in 2001 (physics), the Darsee (Harvard Medical School), Slutsky (UC-San Diego) and Breuning (NIMH) cases involving biomedical research in the early to mid-1980s, and the Industrial Bio-Test case of the late-1970s (involving laboratory testing procedures). One of the most famous cases, involving distinguished faculty and a postdoc at Massachusetts Institute of Technology (MIT), often colloquially referred to as the "Baltimore case", emphasized the inequitable division of responsibility and blame that inevitably follows when such unfortunate events come to light. The very recent Blair case, involving a reporter for the New York Times, included many articles purportedly, but falsely, attributed to interviews with the families of Iraqi war veterans. Even the names Newton, Mendel, Darwin, Pasteur, Haeckel, and Freud have been implicated in greater or lesser sins of adjusting, improving or even fabricating their data, information and scientific conclusions (Judson 2004). In 2006, Eric Poehlman (University of Vermont) became the first researcher in the U.S. to be jailed for scientific misconduct that was unrelated to the deaths of patients (Couzin, 2006).

Simply pointing out that there is a problem is neither surprising nor helpful, and the solutions in this situation are neither simple nor certain. A number of professional societies in our field, such as the Society of Toxicology, the Society for Risk Analysis, and the Society for Environmental Toxicology and Chemistry have addressed the issue of scientific misconduct, and effective responses by the research community will require intense introspection on the part of scientific publications worldwide.

While few would argue that the practice of scientific fraud is common, there is precious little empirical data to support a conclusion either way. This remains true despite the development of a series of specific journals that address the issue directly (e. g., Science and Engineering Ethics, Ethics and Behavior, Accountability in Research, and the Journal of the Society of Research Administrators). The mere existence of this growing body of literature illustrates the existence of the problem, though it also emphasizes that it is far from resolved. Further, the ability to truly understand the magnitude of the issue was questioned by Greenberg (2008) in the Chronicle of Higher Education, when he critically addressed surveys which seek to quantify "misconduct". Irrespective of what the true incidence may be, the presented cases and others beg several questions of editorial boards across the scientific community. This issue is crystallized in the comments of the Editor-in-Chief of Science, and former President of Stanford University, Dr. Donald Kennedy, who opined that "Scientific fraud is not new and is not rare. Luckily its not common either" (Kennedy, 2006). On the heels of Science's retraction of the Hwang papers, Kennedy's comments underscore the difficulties faced by the review process.

It is worth noting that a distinction is often made, albeit a subjective one, between formal, federally articulated "misconduct" and the other forms of unethical behavior. Federal misconduct formally is defined as activity that transgresses moral or civil law, while other unethical behavior can take on many meanings. Tough it may be useful to recognizing the more negative connotation of that specific category of unethical behavior, the distinction is not particularly important, nor emphasized, in this paper.

In its present form, the peer review system serves the valuable function of examination and critique by scientists in relevant disciplines, for the purpose of vetting and improving submitted

papers prior to their acceptance and publication. Implicit in that review process is the fundamental assumption that the reported data are real and that the research actually occurred. There really is "no workable alternative to starting with the assumption that authors are trying to offer a faithful depiction of the facts" (Sox and Rennie 2006). Typically, as is the case with manuscripts submitted to the international journal Human and Ecological Risk Assessment (HERA), the process is intentionally "blind" in both directions, and neither the author nor the reviewer is aware of the identity of the other. A reviewer's responsibilities, among others, include ensuring that the text properly reflects the tabular data, that the tables and figures are necessary and appropriate, and that the conclusions fairly and reasonably reflect the analytical results and the body of previous information available on the subject. Thus, the existing review system probably is not capable of detecting anything but the most obvious instances of fraud. Absent an inherently impractical system where peer reviewers visit laboratories, review lab notebooks and interview research personnel or secondary authors, substantive change in this area is unlikely.

While the intent of a blind review process is laudable and technically valid, it may be that the time honored practice fosters an unhealthy anonymity on the part of both the writer and the reader. Disclosure of both identities arguably would inhibit the temptation to submit manufactured or manipulated data. For example, HERA has employed an author-directed element of the review system for several years. This system requests that authors nominate potential reviewers, with concurrence from HERA's Managing Editor, who typically supplement the list of reviewers. All reviewers of such manuscripts are identified in the final printed article. Remarkably, this kind of review system is seldom used by authors. In our view, journals should amend their author guidelines to speak explicitly about publishing requirements. As a part of that step, it may be beneficial to require authors to sign a legally binding disclosure that clearly identifies the process and penalties that will accompany detection of fraudulent data or misrepresentation. In order to be effective, this disclosure would require signature by all coauthors on a submitted manuscript. Such a step may influence the growing phenomenon of papers with 10, 15 or even more co-authors, some of whom have had little direct knowledge of the results presented or the conclusions drawn. It is that type of "gift authorship" which has been put forth as a potential contributor to some of the fraudulent articles.

Innuendo and speculation regarding suggestions of academic dishonesty clearly are not sufficient to warrant action, and can do great harm. Jealousies and competition certainly could distort fair review. However, cases of properly documented fraudulent research warrant immediate public announcement, which would include identification of the full original citation in the announcement, so that subsequent database searches will pull up both of the references. Such an announcement would be followed by official withdrawal or retraction of the article or articles from the journal. As professionally embarrassing and technically inconvenient as these actions may be to the journal and to its editors, failure to do so is untenable if the allegations against the author(s) are substantiated. Further, in at least one case (Smith, 2005), the entire previous body of work by an author or group may rightly come under retroactive review as a result of proven or demonstrated fraud.

Reflection on these kinds of difficult issues led the editors of HERA to institute some changes in applicable editorial policies. While we acknowledge that the prevention of fraudulent research is a daunting proposition, we are committed to a course of action that will make it more

difficult to publish fraudulent science in our journal. Effective in August 2006, authors who submit manuscripts to HERA are advised that multiple authorship manuscripts explicitly acknowledge that all authors are aware of and in agreement with findings and conclusions in the manuscript. To provide further emphasis for this point, the e-mail addresses of all listed authors are required, and editorial decisions regarding a manuscript are communicated directly to all authors of that paper.

In addition, the HERA Instructions to Authors were revised to notify authors that fraudulent data or other improprieties in a manuscript will result in the manuscript being returned to all authors and notification sent to the authors' institution(s). Moreover, authors are alerted to the need for all authors to be identified for the purpose of trying to avoid preparation of manuscripts by "ghost" authors who might have a conflict of interest in the conduct of the study or in its publication. As a further measure, the HERA guidance to technical reviewers now contains language explicitly asking that any suspected fraudulent data be made known to HERA's editors. Finally, HERA's new Code of Ethics was published for the first time in the August 2006 issue. The Code is provided to all peer reviewers and authors during the manuscript review process. We commit ourselves and our reviewers to ethical conduct in review and publication of independently peer-reviewed science.

These editorial changes in policy were achieved through active dialog and debate amongst members of the HERA Editorial Board and the journal's Senior Editors. We are indebted to those editors who have helped to shape HERA's efforts to prevent fraudulent science from reaching publication in our journal. Many other journals have taken similar steps in this area, and they are to be commended as well.

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